

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C. 20231
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 December 1999 (20.12.99)	
International application No. PCT/EP99/02696	Applicant's or agent's file reference C 2550 PCT
International filing date (day/month/year) 21 April 1999 (21.04.99)	Priority date (day/month/year) 21 April 1998 (21.04.98)
Applicant BURSSENS, Sylvia et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 18 November 1999 (18.11.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Marie-José Devillard Telephone No.: (41-22) 338.83.38
---	--

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C12N 15/82, 15/29, A01H 5/00	A1	(11) International Publication Number: WO 99/54489 (43) International Publication Date: 28 October 1999 (28.10.99)
(21) International Application Number: PCT/EP99/02696 (22) International Filing Date: 21 April 1999 (21.04.99) (30) Priority Data: 98 20 1279.1 21 April 1998 (21.04.98) EP (71) Applicant (for all designated States except US): CROPDE-SIGN N.V. [BE/BE]; Technologiepark 3, B-9052 Zwijnaarde-Gent (BE). (72) Inventors; and (75) Inventors/Applicants (for US only): <u>BURSSSENS</u> , Sylvia [BE/BE]; Bosstraat 60, B-9620 Zottegem (BE). <u>VERBRUGGEN</u> , Nathalie [BE/BE]; 53, avenue des Saisons, B-1050 Ixelles (BE). <u>INZÉ</u> , Dirk [BE/BE]; Driesstraat 18, B-9310 Moorsel-Aalst (BE). <u>BEECKMAN</u> , Tom [BE/BE]; Avenskouter 9, B-9820 Merelbeke (BE). (74) Agent: VOSSIUS & PARTNER; P.O. Box 86 07 67, D-81634 München (DE).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: STRESS TOLERANT PLANTS		
(57) Abstract A method for obtaining plants, tolerant to abiotic stress conditions, in particular osmotic stress, is described, by conferring to a plant the capacity to counteract the stress-induced phosphorylation of Cyclin Dependent Kinase (CDK) proteins. Also vectors for conferring the said capacity are provided.		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

INTERNATIONAL SEARCH REPORT

In tional Application No
PCT/EP 99/02696

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C12N15/82 C12N15/29 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 09685 A (UNIV AUSTRALIAN) 11 June 1992 (1992-06-11) page 6, line 9 - line 32; claims 23-28	25-34
X	DATABASE SCISEARCH 'Online! INSTITUTE FOR SCIENTIFIC INFORMATION, PHILADELPHIA, PA, US AN 96:404830, BARNA, B.: "Production of disease-tolerant and stress-tolerant plants by increasing their juvenility and antioxidant capacity" XP002080509 abstract & NOVENYTERMELES, vol. 44, no. 5/6, 1995, pages 561-567, --- -/-	33

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search

2 September 1999

Date of mailing of the international search report

14/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Maddox, A

INTERNATIONAL SEARCH REPORT

Int .tional Application No

PCT/EP 99/02696

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HEMERLY A ET AL: "DOMINANT NEGATIVE MUTANTS OF THE CDC2 KINASE UNCOUPLE CELL DIVISION FROM ITERATIVE PLANT DEVELOPMENT" EMBO JOURNAL, vol. 14, no. 16, 1995, pages 3925-3936, XP002045514 figure 1 ---	27-31
X	BELL M H ET AL: "TOBACCO PLANTS TRANSFORMED WITH CDC25, A MITOTIC INDUCER GENE FROM FISSION YEAST" PLANT MOLECULAR BIOLOGY, vol. 23, 1993, pages 445-451, XP002045515 the whole document ---	27-31
X	MCKIBBIN, R.S., ET AL.: "Expression of fission yeast cdc25 alters the frequency of lateral root formation in transgenic tobacco" PLANT MOLECULAR BIOLOGY, vol. 36, March 1998 (1998-03), pages 601-612, XP002114000 cited in the application the whole document ---	25-31
X	DE VEYLDER, L., ET AL.: "Expression of mutant CDC2aAt genes in plants with the use of chemical inducible promoters" MED. FAC. LANDNOUWW. UNIV. GENT, vol. 60/4a, 1995, page 1701 XP002080508 the whole document ---	25-31
P,X	WO 99 14331 A (ALMEIDA JANICE DE ;LANDRIEU ISABELLE (BE); VEYLDER LIEVEN DE (BE);) 25 March 1999 (1999-03-25) page 41, line 13 - line 24 page 42, line 1 - line 3; claim 41 ---	33
A	BRACALE, M., ET AL.: "Water deficit in pea root tips: effects on the cell cycle and on the production of dehydrin-like proteins" ANN BOT, vol. 79, 1997, pages 593-600, XP002080503 the whole document ---	1,32-34
A	SACKS, M.M., ET AL.: "Effect of water stress on cortical cell division rates within the apical meristem of primary roots of maize" PLANT PHYSIOLOGY, vol. 114, 1997, pages 519-527, XP002080504 the whole document ---	1,32-34
	-/--	

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/02696

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>ZHANG, K., ET AL.: "Cytokinin controls the cell cycle at mitosis by stimulating the tyrosine dephosphorylation and activation of p34cdc2-like H1 histone kinase"</p> <p>PLANTA,</p> <p>vol. 200, 1996, pages 2-12, XP002080507</p> <p>the whole document</p> <p style="text-align: center;">---</p>	1,14
A	<p>NAGL, W.: "Cdc2-kinases, cyclins, and the switch from proliferation to polyploidization"</p> <p>PROTOPLASMA,</p> <p>vol. 188, 1995, pages 143-150, XP002076333</p> <p>the whole document</p> <p style="text-align: center;">---</p>	1
A	<p>NAGL, W.: "Induction of high polyploidy in Phaseolus cell cultures by the protein kinase inhibitor, K-252a"</p> <p>PLANT CELL REPORTS,</p> <p>vol. 12, 1993, pages 170-174, XP002076331</p> <p style="text-align: center;">---</p>	1
A	<p>BERGOUNIOUX, C., ET AL.: "Relation between protoplast division, cell-cycle stage and nuclear chromatin structure"</p> <p>PROTOPLASMA,</p> <p>vol. 142, 1988, pages 127-136, XP002080505</p> <p>the whole document</p> <p style="text-align: center;">---</p>	1
A	<p>DUDITS, D. ET AL: "Cyclin-dependent and calcium-dependent kinase families: response of cell division cycle to hormone and stress signals"</p> <p>PORTLAND PRESS RES. MONOGR. (1998),</p> <p>10(PLANT CELL DIVISION), 21-45,</p> <p>XP002080506</p> <p>the whole document</p> <p style="text-align: center;">---</p>	1
A	<p>WO 97 13843 A (CORNELL RES FOUNDATION INC ;UNIV WASHINGTON (US))</p> <p>17 April 1997 (1997-04-17)</p> <p>the whole document</p> <p style="text-align: center;">---</p>	32-34
A	<p>WO 98 03631 A (SALK INST FOR BIOLOGICAL STUDI) 29 January 1998 (1998-01-29)</p> <p>the whole document</p> <p style="text-align: center;">---</p>	1
E	<p>WO 99 22002 A (ALMEIDE JANICE DE ;VEYLDER LIEVEN DE (BE); INZE DIRK (BE); CROPDES)</p> <p>6 May 1999 (1999-05-06)</p> <p>page 21 last 3 lines</p> <p>page 26, paragraph 3</p> <p>page 32, line 9 - line 20; claims 18,28</p> <p style="text-align: center;">-----</p>	33

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/02696

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9209685	A	11-06-1992	AU 657722 B	23-03-1995
			AU 9046291 A	25-06-1992
			CA 2097286 A	30-05-1992
			EP 0559729 A	15-09-1993
			JP 6504430 T	26-05-1994
			US 5750862 A	12-05-1998
WO 9914331	A	25-03-1999	AU 9540698 A	05-04-1999
WO 9713843	A	17-04-1997	AU 7397796 A	30-04-1997
			CA 2234168 A	17-04-1997
			EP 0874897 A	04-11-1998
			NZ 321080 A	28-05-1999
WO 9803631	A	29-01-1998	AU 3960597 A	10-02-1998
			EP 0929663 A	21-07-1999
WO 9922002	A	06-05-1999	AU 1557299 A	17-05-1999

ATENT COOPERATION TREA

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference C 2550 PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 99/ 02696	International filing date (day/month/year) 21/04/1999	(Earliest) Priority Date (day/month/year) 21/04/1998
Applicant CROPDESIGN N.V. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 99/02696

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12N15/82 C12N15/29 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 09685 A (UNIV AUSTRALIAN) 11 June 1992 (1992-06-11) page 6, line 9 - line 32; claims 23-28 ---	25-34
X	DATABASE SCISEARCH 'Online! INSTITUTE FOR SCIENTIFIC INFORMATION, PHILADELPHIA, PA, US AN 96:404830, BARNA, B.: "Production of disease-tolerant and stress-tolerant plants by increasing their juvenility and antioxidant capacity" XP002080509 abstract & NOVENYTERMELES, vol. 44, no. 5/6, 1995, pages 561-567, --- -/--	33



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

2 September 1999

Date of mailing of the international search report

14/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Maddox, A

INTERNATIONAL SEARCH REPORT

International Application No

CT/EP 99/02696

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HEMERLY A ET AL: "DOMINANT NEGATIVE MUTANTS OF THE CDC2 KINASE UNCOUPLE CELL DIVISION FROM ITERATIVE PLANT DEVELOPMENT" EMBO JOURNAL, vol. 14, no. 16, 1995, pages 3925-3936, XP002045514 figure 1 ----	27-31
X	BELL M H ET AL: "TOBACCO PLANTS TRANSFORMED WITH CDC25, A MITOTIC INDUCER GENE FROM FISSION YEAST" PLANT MOLECULAR BIOLOGY, vol. 23, 1993, pages 445-451, XP002045515 the whole document ----	27-31
X	MCKIBBIN, R.S., ET AL.: "Expression of fission yeast cdc25 alters the frequency of lateral root formation in transgenic tobacco" PLANT MOLECULAR BIOLOGY, vol. 36, March 1998 (1998-03), pages 601-612, XP002114000 cited in the application the whole document ----	25-31
X	DE VEYLDER, L., ET AL.: "Expression of mutant CDC2aAt genes in plants with the use of chemical inducible promoters" MED. FAC. LANDNOUWW. UNIV. GENT, vol. 60/4a, 1995, page 1701 XP002080508 the whole document ----	25-31
P,X	WO 99 14331 A (ALMEIDA JANICE DE ;LANDRIEU ISABELLE (BE); VEYLDER LIEVEN DE (BE);) 25 March 1999 (1999-03-25) page 41, line 13 - line 24 page 42, line 1 - line 3; claim 41 ----	33
A	BRACALE, M., ET AL.: "Water deficit in pea root tips: effects on the cell cycle and on the production of dehydrin-like proteins" ANN BOT, vol. 79, 1997, pages 593-600, XP002080503 the whole document ----	1,32-34
A	SACKS, M.M., ET AL.: "Effect of water stress on cortical cell division rates within the apical meristem of primary roots of maize" PLANT PHYSIOLOGY, vol. 114, 1997, pages 519-527, XP002080504 the whole document ---- -/--	1,32-34

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 99/02696

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ZHANG, K., ET AL.: "Cytokinin controls the cell cycle at mitosis by stimulating the tyrosine dephosphorylation and activation of p34cdc2-like H1 histone kinase" PLANTA, vol. 200, 1996, pages 2-12, XP002080507 the whole document ---	1,14
A	NAGL, W.: "Cdc2-kinases, cyclins, and the switch from proliferation to polyploidization" PROTOPLASMA, vol. 188, 1995, pages 143-150, XP002076333 the whole document ---	1
A	NAGL, W.: "Induction of high polyploidy in Phaseolus cell cultures by the protein kinase inhibitor, K-252a" PLANT CELL REPORTS, vol. 12, 1993, pages 170-174, XP002076331 ---	1
A	BERGOUNIOUX, C., ET AL.: "Relation between protoplast division, cell-cycle stage and nuclear chromatin structure" PROTOPLASMA, vol. 142, 1988, pages 127-136, XP002080505 the whole document ---	1
A	DUDITS, D. ET AL: "Cyclin-dependent and calcium-dependent kinase families: response of cell division cycle to hormone and stress signals" PORTLAND PRESS RES. MONOGR. (1998), 10(PLANT CELL DIVISION), 21-45, XP002080506 the whole document ---	1
A	WO 97 13843 A (CORNELL RES FOUNDATION INC ;UNIV WASHINGTON (US)) 17 April 1997 (1997-04-17) the whole document ---	32-34
A	WO 98 03631 A (SALK INST FOR BIOLOGICAL STUDI) 29 January 1998 (1998-01-29) the whole document ---	1
E	WO 99 22002 A (ALMEIDE JANICE DE ;VEYLDER LIEVEN DE (BE); INZE DIRK (BE); CROPDES) 6 May 1999 (1999-05-06) page 21 last 3 lines page 26, paragraph 3 page 32, line 9 - line 20; claims 18,28 -----	33

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/02696

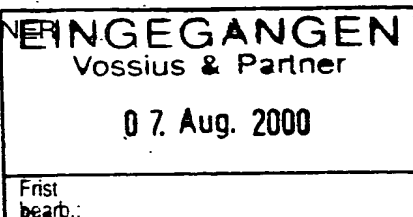
Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9209685	A	11-06-1992	AU 657722 B AU 9046291 A CA 2097286 A EP 0559729 A JP 6504430 T US 5750862 A	23-03-1995 25-06-1992 30-05-1992 15-09-1993 26-05-1994 12-05-1998
WO 9914331	A	25-03-1999	AU 9540698 A	05-04-1999
WO 9713843	A	17-04-1997	AU 7397796 A CA 2234168 A EP 0874897 A NZ 321080 A	30-04-1997 17-04-1997 04-11-1998 28-05-1999
WO 9803631	A	29-01-1998	AU 3960597 A EP 0929663 A	10-02-1998 21-07-1999
WO 9922002	A	06-05-1999	AU 1557299 A	17-05-1999

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

VOSSIUS & PARTNER
Postfach 86 07 67
D-81634 München
ALLEMAGNE



PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)

Date of mailing (day/month/year)	02.08.2000
-------------------------------------	------------

Applicant's or agent's file reference C 2550 PCT	IMPORTANT NOTIFICATION
---	-------------------------------

International application No. PCT/EP99/02696	International filing date (day/month/year) 21/04/1999	Priority date (day/month/year) 21/04/1998
---	--	--

Applicant CROPDESIGN N.V. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
---------------------------------------	--------------------



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Faux, K

Tel. +49 89 2399-8062



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference C 2550 PCT		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/02696	International filing date (day/month/year) 21/04/1999	Priority date (day/month/year) 21/04/1998	
International Patent Classification (IPC) or national classification and IPC C12N15/82			
Applicant CROPDESIGN N.V. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 18/11/1999	Date of completion of this report 02.08.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Keller, Y Telephone No. +49 89 2399 7419 <div data-bbox="1372 1852 1529 1999" data-label="Image"> </div>

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/02696

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-42 as originally filed

Claims, No.:

1-34 as originally filed

Drawings, sheets:

1/7-7/7 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
☒ claims Nos. 1-4.

because:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/02696

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-4 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 5-34
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 5-34
Industrial applicability (IA)	Yes: Claims 5-34
	No: Claims

2. Citations and explanations

s e separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/02696

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 1-4 lack clarity (see Item VIII) therefore a meaningful evaluation with regard to novelty, inventive step and industrial applicability can not be carried out.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: Dudits, D., et al., Portland press res. monogr., 1998, 10 (plant cell division), pages 21-45.

D2: WO 9209685

D3: Hemerly, A., et al., EMBO journal, 1998, vol. 14, pages 3925-3936.

Novelty.

The subject-matter of claims 5-34 is not anticipated by the documents cited in the international search report.

Therefore, said claim meets the requirements of Article 33(2) PCT.

Inventive step.

1. D1 discloses that cdc2 is more active in proliferating tissues (page 31, lines 7-18). The kinase activity of p34^{cdc2} is inhibited, by rising concentration of ABA (a stress hormone) as well as other stresses such as heat stress or osmotic choc (page 35, 2nd§). The cell division cycle is influenced by several environmental factors. Extreme conditions can block the cell cycle by repressing the p34^{cdc2} kinase activity e.g in alfalfa osmotically shocked cells (page 39, last §, fig. 7).
2. D2 discloses the transformation in of plants with CDKs mutated or not (e.g

p34^{cdc2}) and/or other proteins controlling the cell cycle (claims, page 5 lines 7-17). This transformation resulting in the control of plant cell growth, e.g improve the yield of plants, under different environmental condition. This control leads to a better resistance to stress (abstract; page 8, lines 19-3).

3. D3 discloses plants transformed with cdc2aA14F15 a cdc2a mutein. These mutation results in constitutive active cdc2a and does not affect the plant development (page 3932, lines 20-30, Abstract).
4. D2 is considered as being the closest prior art among the document cited in the International search Report.
5. The main differences between D2 and the present application is the disclosure in the present application of a method to obtain stress resistant plants consisting in controlling the cell cycle by blocking inhibitory phosphorylation of CDK.
6. Therefore the technical problem to be solved is to provide an alternative method to obtain stress resistant plants.
7. Being aware that in plants under stress condition the cell cycle is blocked particularly by inhibition of the p32^{cdc2} kinase activity and that plants can be successfully transformed with CDK and/or regulatory elements which regulate p34^{cdc2} activity (D1 and/or D2). It would be obvious, with reasonable expectation of success, for the skilled person to restore normal cell cycle by genetically engineering plants so that CDK are not susceptible to inhibitory phosphorylation, to get plants showing higher resistance to abiotic stress. Furthermore, the selection of p34^{cdc2} mutations and regulatory elements are obvious in the light of the teaching of D3 (published by the inventor) and D2 respectively.
Thus, the subject matter of claims 5-34 does not meet the requirements of Article 33(3) PCT.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/02696

Re Item VIII

Certain observations on the international application

8. Claims 1-4 do not meet the requirements of Article 6 PCT in that they are devoid of any technical feature to properly define the "invention". The claimed subject-matter of said claims is merely drafted as a result to be achieved. Furthermore, the claims are so broadly drafted that an objection for unity of invention would arise.
9. Figure 4 does not meet the requirements of Art. 6 PCT since the distinction between 0% NaCl and 0.5% NaCl can not be made (see page 35 of the present application).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference C 2550 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/02696	International filing date (day/month/year) 21/04/1999	Priority date (day/month/year) 21/04/1998
International Patent Classification (IPC) or national classification and IPC C12N15/82		
Applicant CROPDESIGN N.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 18/11/1999	Date of completion of this report 02.08.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Keller, Y Telephone No. +49 89 2399 7419 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/02696

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-42 as originally filed

Claims, No.:

1-34 as originally filed

Drawings, sheets:

1/7-7/7 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
☒ claims Nos. 1-4.

because:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/02696

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-4 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	5-34
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	5-34
Industrial applicability (IA)	Yes:	Claims	5-34
	No:	Claims	

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 1-4 lack clarity (see Item VIII) therefore a meaningful evaluation with regard to novelty, inventive step and industrial applicability can not be carried out.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: Dudits, D., et al., Portland press res. monogr., 1998, 10 (plant cell division), pages 21-45.

D2: WO 9209685

D3: Hemerly, A., et al., EMBO journal, 1998, vol. 14, pages 3925-3936.

Novelty.

The subject-matter of claims 5-34 is not anticipated by the documents cited in the international search report.

Therefore, said claim meets the requirements of Article 33(2) PCT.

Inventive step.

1. D1 discloses that cdc2 is more active in proliferating tissues (page 31, lines 7-18). The kinase activity of p34^{cdc2} is inhibited, by rising concentration of ABA (a stress hormone) as well as other stresses such as heat stress or osmotic choc (page 35, 2nd§). The cell division cycle is influenced by several environmental factors. Extreme conditions can block the cell cycle by repressing the p34^{cdc2} kinase activity e.g in alfalfa osmotically shocked cells (page 39, last §, fig. 7).
2. D2 discloses the transformation in of plants with CDKs mutated or not (e.g

p34^{cdc2}) and/or other proteins controlling the cell cycle (claims, page 5 lines 7-17). This transformation resulting in the control of plant cell growth, e.g improve the yield of plants, under different environmental condition. This control leads to a better resistance to stress (abstract; page 8, lines 19-3).

3. D3 discloses plants transformed with cdc2aA14F15 a cdc2a mutein. These mutation results in constitutive active cdc2a and does not affect the plant development (page 3932, lines 20-30, Abstract).
4. D2 is considered as being the closest prior art among the document cited in the International search Report.
5. The main differences between D2 and the present application is the disclosure in the present application of a method to obtain stress resistant plants consisting in controlling the cell cycle by blocking inhibitory phosphorylation of CDK.
6. Therefore the technical problem to be solved is to provide an alternative method to obtain stress resistant plants.
7. Being aware that in plants under stress condition the cell cycle is blocked particularly by inhibition of the p32^{cdc2} kinase activity and that plants can be successfully transformed with CDK and/or regulatory elements which regulate p34^{cdc2} activity (D1 and/or D2). It would be obvious, with reasonable expectation of success, for the skilled person to restore normal cell cycle by genetically engineering plants so that CDK are not susceptible to inhibitory phosphorylation, to get plants showing higher resistance to abiotic stress. Furthermore, the selection of p34^{cdc2} mutations and regulatory elements are obvious in the light of the teaching of D3 (published by the inventor) and D2 respectively.
Thus, the subject matter of claims 5-34 does not meet the requirements of Article 33(3) PCT.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/02696

Re Item VIII

Certain observations on the international application

8. Claims 1-4 do not meet the requirements of Article 6 PCT in that they are devoid of any technical feature to properly define the "invention". The claimed subject-matter of said claims is merely drafted as a result to be achieved. Furthermore, the claims are so broadly drafted that an objection for unity of invention would arise.
9. Figure 4 does not meet the requirements of Art. 6 PCT since the distinction between 0% NaCl and 0.5% NaCl can not be made (see page 35 of the present application).